AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (currently amended) A swept slotted three-dimensional airfoil having a span and a predetermined three-dimensional shape tailored to improve transonic performance over an un-slotted airfoil, the airfoil comprising:

at least one leading airfoil element having an upper surface and a lower surface;

at least one trailing airfoil element defining a full-span transonic cruise slot with the leading airfoil element, the trailing airfoil element having an upper surface and a lower surface, the slot being positioned spanwise along the span at a position where the airfoil experiences Mach critical flow and having a predetermined three-dimensional shape to allow~~; and at least one full-span slot defined by the airfoil during at least one transonic condition of the airfoil, the slot allowing~~ a portion of the air flowing along the lower surface of the leading airfoil element to diverge to ~~split and~~ flow over the upper surface of the trailing airfoil element and, thereby, to provide the ~~so as to achieve a~~ performance improvement~~ in the transonic condition~~.

2. (original) A swept aircraft wing comprising the airfoil of claim 1.

3. (original) The wing of claim 2, wherein the slot includes an aerodynamically smooth channel defined between the leading and trailing airfoil elements without an unfaired cove.

4. (currently amended) The wing of claim 2, wherein the slot is configured to improve performance of the wing by [[a]] at least one criterion selected from ~~one or more of the group consisting of~~:

an increase in cruise speed;

an increase in lift;

an increase in thickness;

a reduction in sweep;

a reduction in drag; or

a combination thereof.

5. (currently amended) The wing of claim 2, wherein the slot extends spanwise along the wing where airflow separation would occur to add drag ~~at the~~ during a transonic condition of the wing.

6. (original) The wing of claim 2, wherein the slot is configured to push shock waves generated by supersonic flow across the wing to a position further aft on the wing.

7. (original) The wing of claim 2, wherein the slot is configured to increase the drag-divergence Mach number capability of the wing while at least maintaining a comparable aerodynamic efficiency for the wing.

8. (original) The wing of claim 2, wherein the slot is configured to mitigate shock waves and provide a higher cruise speed for the wing.

9. (original) The wing of claim 2, further comprising an actuator structure coupled to the leading and trailing airfoil elements for moving one of the leading and trailing airfoil elements relative to the other element to trim the slot.

10. (currently amended) The wing of claim 9 [[2]], wherein the actuator structure is configured to trim the slot by at least one action selected from ~~one or more of the group consisting of~~:

adjusting a gap separating the leading and trailing airfoil elements, the gap defining the slot;

adjusting a relative height between the leading and trailing airfoil elements; [[and]]

adjusting an angle between the leading and trailing airfoil elements; or a combination thereof.

11. (currently amended) The wing of claim 2, wherein the slot includes a plurality of segments longitudinally arranged along the wing, each of the segments being independently adjustable by the actuator structure to allow trimming of the slot differently at different locations along the span.

~~longitudinally~~

12. (original) The wing of claim 2, further comprising an actuator structure coupled to the leading and trailing airfoil elements for moving one of the leading and trailing airfoil elements relative to the other element to close the slot during at least one subsonic condition and to open the slot during the transonic condition.

13. (currently amended) The wing of claim 2, wherein the slot is defined during at least one transonic condition of the wing [[is]] selected from at least one ~~or more of the group consisting~~ of a cruise condition and a maneuver.

14. (original) The wing of claim 2, wherein:

the leading airfoil element comprises a main wing portion;

the trailing airfoil element comprises a flap; and

the wing further comprises an actuator structure for trimming the flap during cruise to improve performance of the wing during cruise.

15. (original) An aircraft comprising the airfoil of claim 1.

16. (currently amended) A method for flying a slotted [[an]] aircraft wing having a predetermined three-dimensional shape tailored to improve transonic performance over an un-slotted wing, a span, at least one leading airfoil element, and at least one [[a]] trailing airfoil element defining at least one full-span transonic cruise slot with the leading airfoil element, the slot being positioned along the span at a position where the wing experiences Mach critical flow and having a predetermined three-dimensional shape to allow a portion of the air flowing along a lower surface of the leading airfoil element to diverge to flow over the upper surface of the trailing airfoil element and, thereby, to provide the performance improvement, ~~and at least one full-span slot defined between the leading airfoil element and the trailing airfoil element during at least one transonic condition,~~ the method comprising trimming the slot during a [[the]] transonic condition so as to achieve a performance improvement in the transonic condition.

17. (currently amended) The method of claim 16, wherein the transonic condition is selected from at least one ~~or more of the group consisting~~ of a cruise condition and a maneuver.

18. (original) The method of claim 16, wherein:

the leading airfoil element comprises a main wing portion;

the trailing airfoil element comprises a flap assembly; and

trimming the slot comprises actuating the flap assembly.

19. (currently amended) The method of claim 16, wherein trimming the slot comprises at least one action selected from ~~one or more of the group consisting of~~:

adjusting a gap separating the leading and trailing airfoil elements, the gap defining the slot;

adjusting a relative height between the leading and trailing airfoil elements; [[and]]

adjusting an angle between the leading and trailing airfoil elements; or a combination thereof.

20. (original) The method of claim 16, further comprising closing the slot during at least one subsonic condition of the wing.

21. (original) The method of claim 16, wherein the slot includes an aerodynamically smooth channel defined between the leading and trailing airfoil elements without an unfaired cove.

22. (currently amended) A method for flying a swept slotted aircraft wing defining at least one full-span transonic cruise slot positioned along the span at a position where the wing experiences Mach critical flow and having a predetermined three-dimensional shape tailored to improve transonic performance over an un-slotted wing, the method comprising using the ~~at least one~~ full-span slot ~~defined by the wing~~ to divert a portion of the air flowing along a lower surface of the wing to ~~split and~~ flow over an upper surface of the wing during at least one transonic condition of the wing, the diverting at least delaying airflow separation that would occur to add drag at the transonic condition so as to achieve a performance improvement in the transonic condition.

23. (original) The method of claim 22, further comprising trimming the slot during the transonic condition.

24. (currently amended) The method of claim 23[[22]], wherein trimming the slot comprises at least one action selected from ~~one or more of the group consisting of~~:

adjusting a gap separating a leading element and a trailing element, the gap defining the slot;

adjusting a relative height between the leading element and the trailing element; [[and]]

adjusting an angle between the leading element and the trailing element; or

a combination thereof.

25. (currently amended) The method of claim <u>24</u>[[22]], wherein:

the leading airfoil element comprises a main wing portion;

the trailing airfoil element comprises a flap assembly; and

trimming the slot comprises actuating the flap assembly.

26. (original) The method of claim 22, further comprising opening the slot when at or near the transonic condition.

27. (original) The method of claim 22, further comprising closing the slot during at least one subsonic condition of the wing.

28. (original) The method of claim 22, wherein the slot includes an aerodynamically smooth channel defined between the leading and trailing airfoil elements without an unfaired cove.

29. (currently amended) A method for flying <u>a slotted</u> [[an]] aircraft wing having <u>a predetermined three-dimensional shape tailored to improve transonic performance over an un-slotted wing, a span,</u> a main wing portion, <u>and</u> a flap assembly[[, and]] <u>defining</u> at least one full-span <u>transonic cruise</u> slot <u>with</u> ~~defined between~~ the main wing portion ~~and the flap assembly~~ during cruise, <u>the slot being positioned along the span at a position where the wing experiences Mach critical flow and having a predetermined three-dimensional shape to allow a portion of the air flowing along a lower surface of the leading airfoil element to diverge to flow over the upper surface of the trailing airfoil element and, thereby, to provide the performance improvement</u>, the method comprising actuating the flap assembly during cruise to trim the flap assembly so as to achieve a performance improvement during cruise.

30. (original) The method of claim 29, wherein the slot includes an aerodynamically smooth channel defined between the leading and trailing airfoil elements without an unfaired cove.

31. (new) The airfoil of claim 1, wherein slot location substantially coincides with shock location.

32. (new) The airfoil of claim 1, wherein the three-dimensional shape of the airfoil is tailored in accordance with three-dimensional airfoil pressure distribution data including information related to three-dimensional shock location and sweep of the airfoil.

33. (new) The airfoil of claim 1, wherein the airfoil has a pressure distribution corresponding to that shown in the figures.

34. (new) A method comprising tailoring a swept wing's three-dimensional geometry using three-dimensional wing pressure distribution data including information related to three-dimensional shock location such that the wing defines at least one full-span transonic cruise slot that allows a portion of the air flowing along a lower surface of the wing to diverge to flow over an upper surface of the wing during at least one transonic condition of the wing so as to achieve a performance improvement in the transonic condition.

35. (new) The method of claim 34, wherein the tailoring includes locating the slot substantially coincident with shock location.

36. (new) The method of claim 34, further comprising obtaining the three-dimensional wing pressure distribution data by computational modeling.

37. (new) The method of claim 34, further comprising obtaining the three-dimensional wing pressure distribution data by simulating an airflow over the wing using three-dimensional computational fluid dynamics.

38. (new) The method of claim 37, wherein the tailoring includes locating the slot where the three-dimensional computational fluid dynamics simulated airflow suggests that a pressure field will result in airflow separation on the upper surface of the wing.